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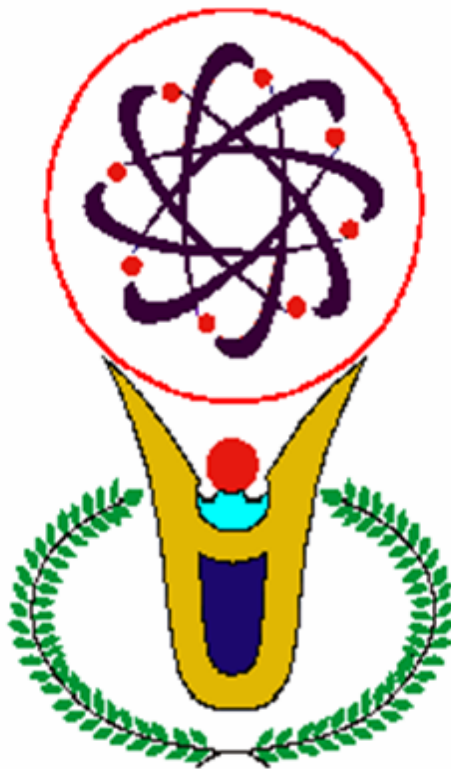
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**4<sup>th</sup> International Mathematics and Science Olympiad  
(IMSO) for Primary School 2007**

**THEORETICAL EXAMINATION I**

**(60 MINUTES)**



| Name | Country |
|------|---------|
|      |         |

**Jakarta, Indonesia  
Tuesday, 13 November 2007**

Name: \_\_\_\_\_; Country: \_\_\_\_\_

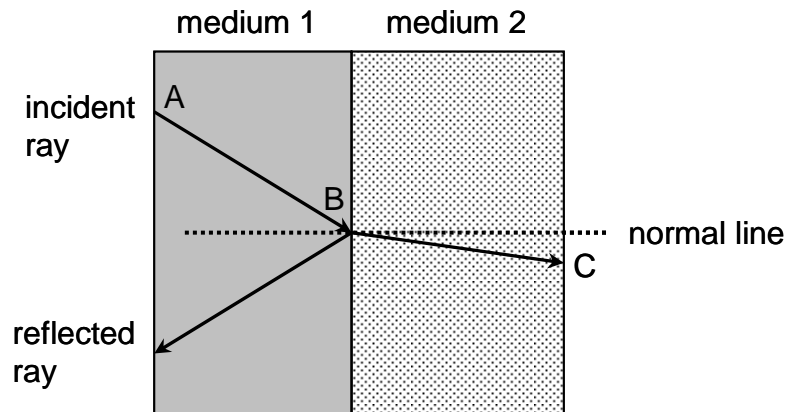
### **INSTRUCTIONS**

1. Check the number of pages in this Theoretical Examination I. There are 17 pages including the cover.
2. The total number of problems is 30.
3. Make sure you write your name and country on every page.
4. There are several type of problems: multiple choices, short answer, and explanation (essay) or a combination of them.

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 1. Multiple choice (score: 1)**

A ray of light strikes the interface between two media. At the interface some light is reflected and some light refracted as shown in figure.

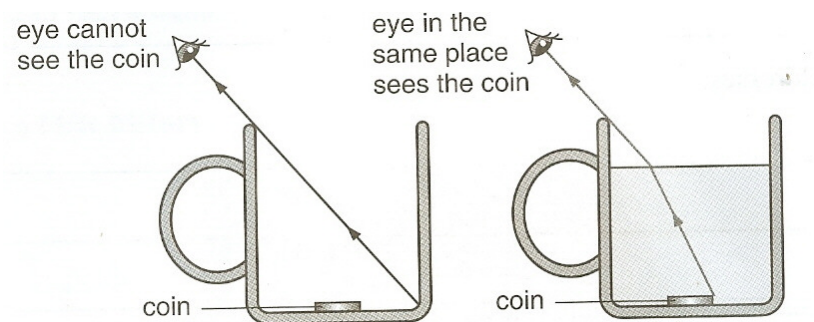


If medium 1 is water and the refracted ray follows path C in medium 2, what can you conclude with medium 2?

- A. water
- B. air
- C. glass
- D. methanol
- E. wood

**No 2. Short answers (score: 2)**

John places a coin in a cup as shown below. Ali looks into the cup so that the coin is out of sight. John then pours water into the cup until Ali can see the coin.



- (a) What process is involved? .....
- (b) Will the coin appear deeper or shallower when under water? .....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 3. Multiple choice (score: 1)**

Some animals have strategies to escape from predators or enemies, such as producing a bad smell, changing color, *etc.* Which is the following tactics that is used by squid?

- A. By curling its body
- B. By having an electric tail
- C. By detaching its tail easily
- D. By excreting ink
- E. By changing body color

**No 4. Multiple choice (score: 1)**

Snakes are different from worms because snakes have .....

- A. Slime
- B. Eggs
- C. Segments
- D. Scales
- E. Color

**No 5 Multiple choice (score: 1)**

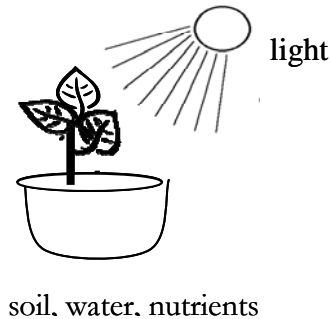
Which one of the activities described in the table below does not match the characteristic of all living things.

| Characteristic |              | Activity                            |
|----------------|--------------|-------------------------------------|
| A.             | Excretion    | Removal of poisonous waste products |
| B.             | Reproduction | Making new individuals              |
| C.             | Sensitivity  | Responding to stimuli               |
| D.             | Growth       | Decrease in total body weight       |
| E.             | Nutrition    | Require food                        |

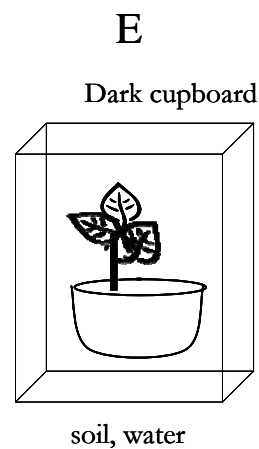
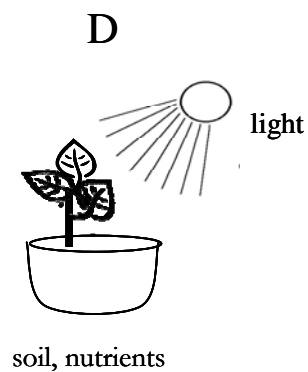
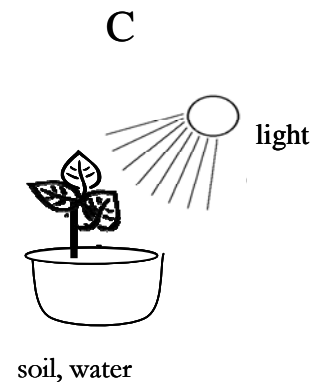
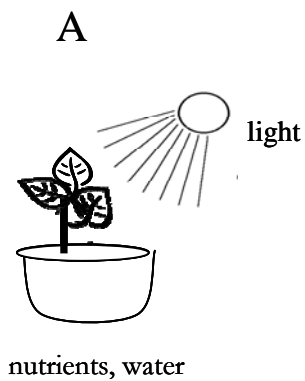
Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 6 Multiple choice (score: 1)**

Elvira wants to prove that plants need some nutrients in the soil. In order to test her idea she uses two pots of plant. She sets up one pot of plant as shown below.



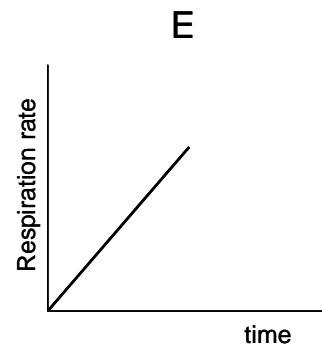
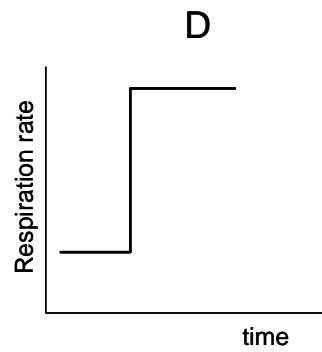
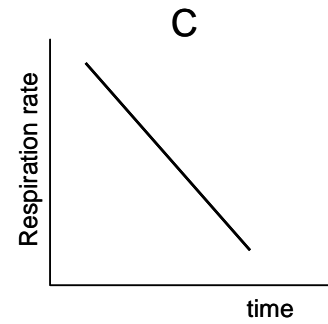
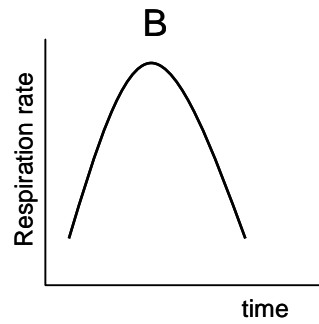
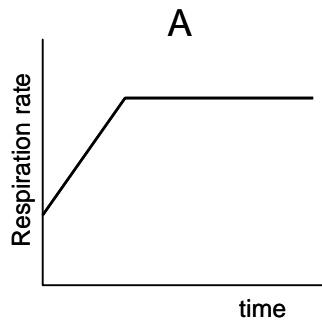
Which one of the following should she use as a control set-up?



Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 7. Multiple choice (score: 1)**

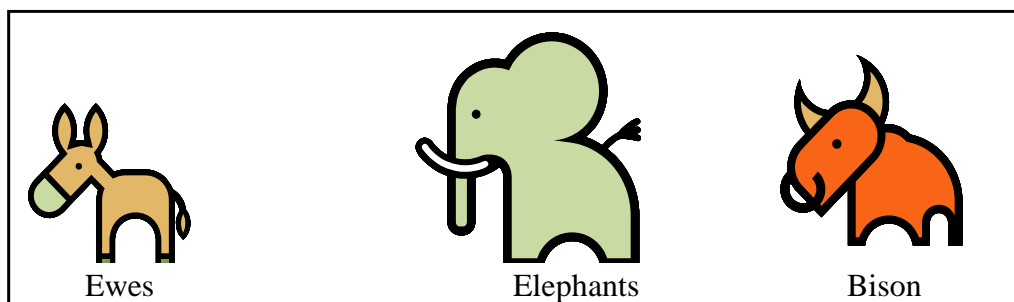
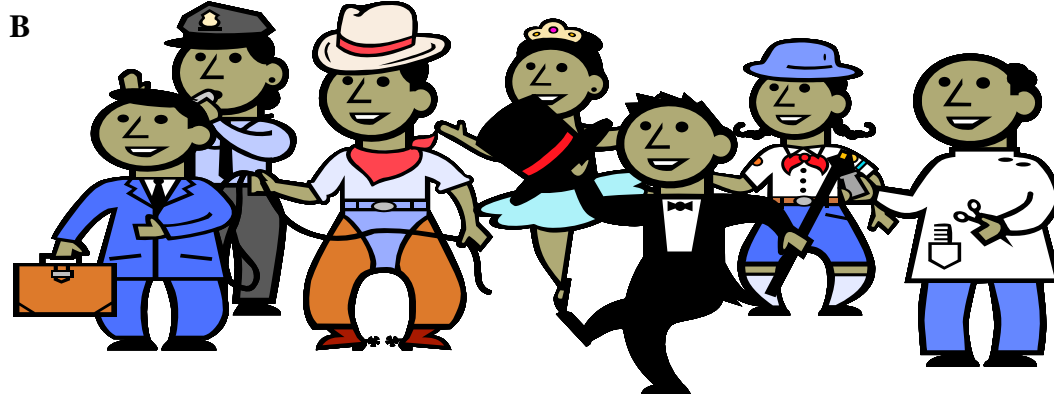
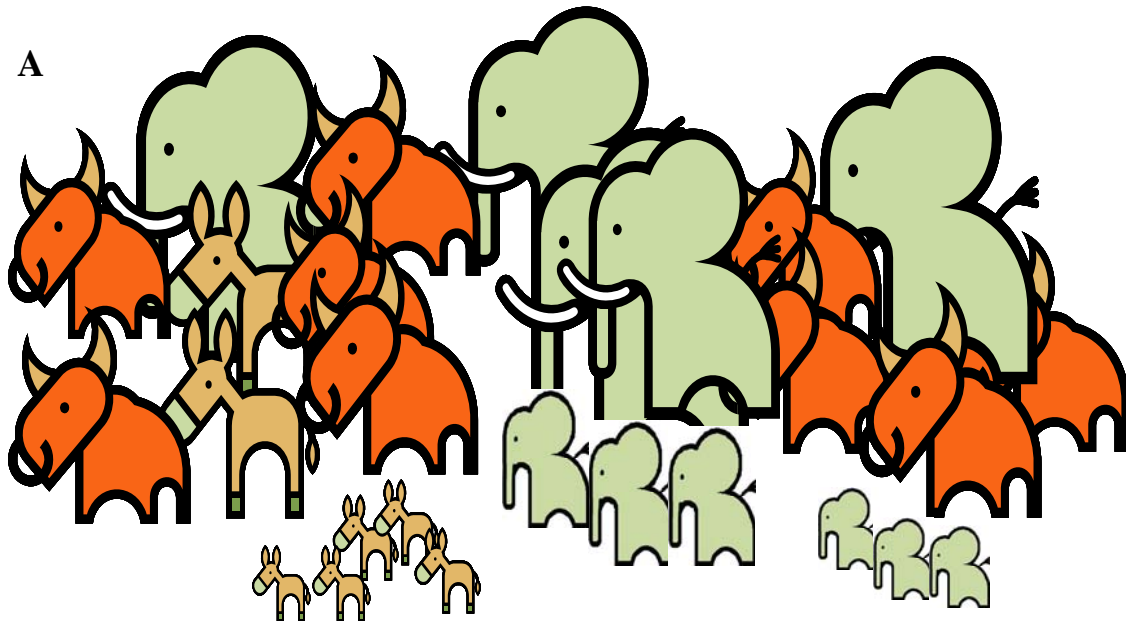
Choose a hypothetical graph to show the respiration of an animal in a closed chamber over a period of time.



Name: \_\_\_\_\_; Country: \_\_\_\_\_

No 8 Short Answer (score: 2)

Look at the following pictures carefully:



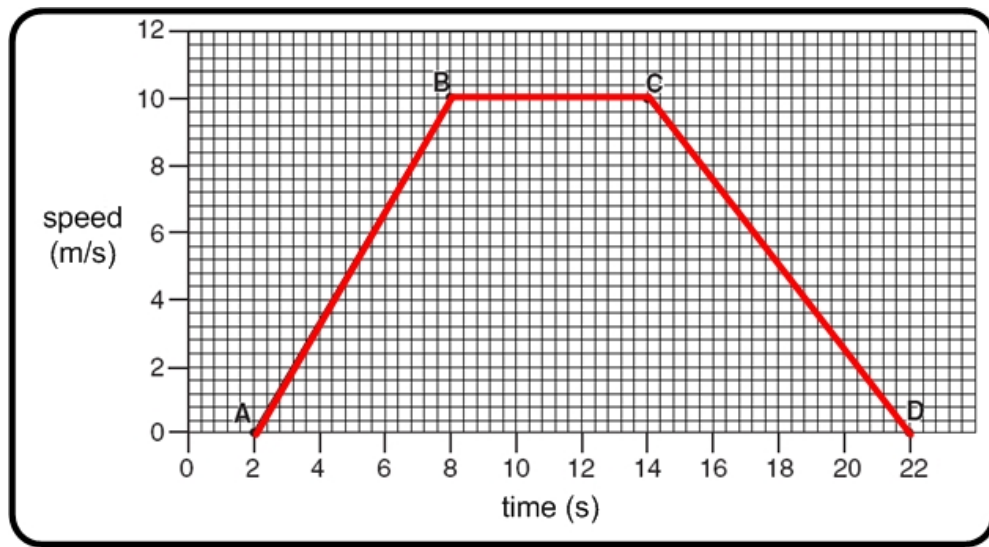
Based on your understanding in biology, identify how many population in A and how many population in B.

Answer: .....  
.....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 9. Short answer (3)**

The figure below is a graph of a vehicle's speed during certain time intervals.



(i) At which points was the vehicle at rest?

.....

(ii) Describe the motion between **B** and **C**.

.....

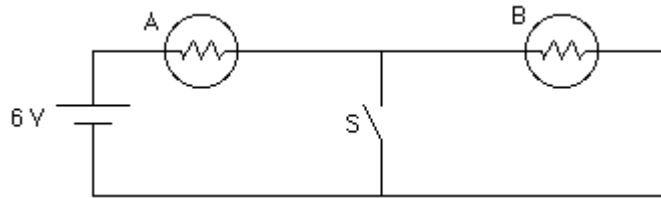
(iii) Describe the motion between **C** and **D**.

.....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 10. Multiple choice (score: 1)**

Two identical light bulbs are arranged in a circuit with a battery, and a switch S, as shown in figure with the switch open.

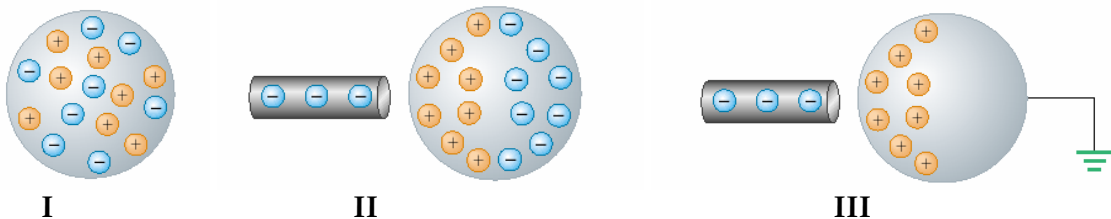


If the switch is closed, which is the correct statement?

- A. The brightness of bulb A stays the same
- B. The brightness of bulb A increases
- C. The brightness of bulb B increases
- D. The brightness of bulb A decreases
- E. The brightness of bulb B stay the same

**No 11. Multiple choice and explanation (score: 2)**

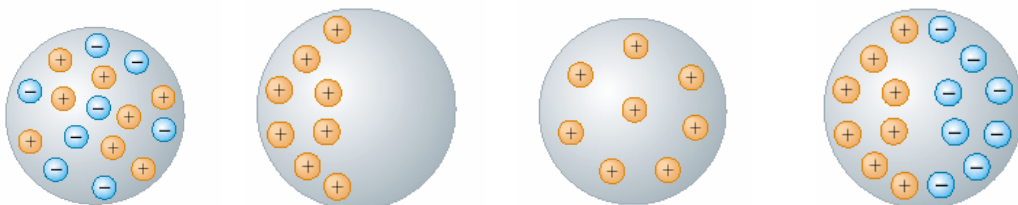
The figures below represent the induction process.



- I → A neutral metallic sphere
- II → A negatively charged rubber rod is placed near the sphere.
- III → The sphere is grounded

(a) What will happen with the charges on the sphere if the ground connection is removed and then the rod is removed? (Choose one)

- A.                      B.                      C.                      D.



(b). Explain the charge distribution on **Figure II**.

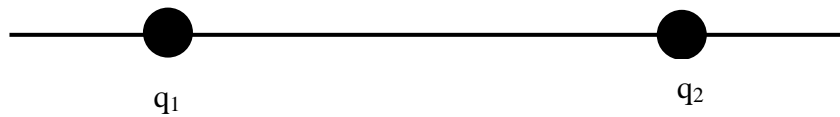
Answer: .....

.....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 12. Short answer (score: 1)**

Two identical positive charges  $q_1$  and  $q_2$  are arranged along the x axis as shown.

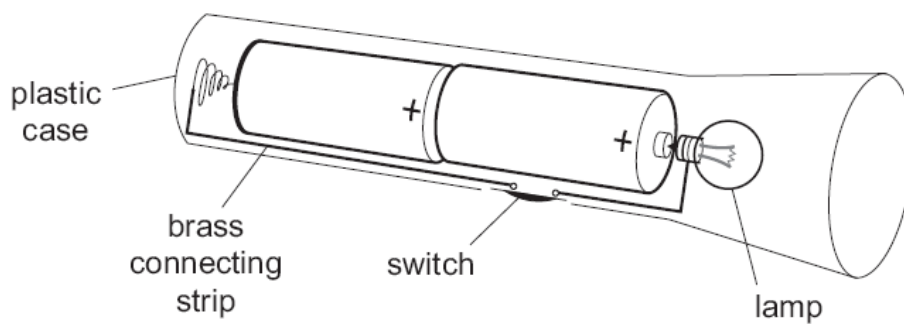


Where should another charged particle be placed along the line if we want its resultant force to be zero?

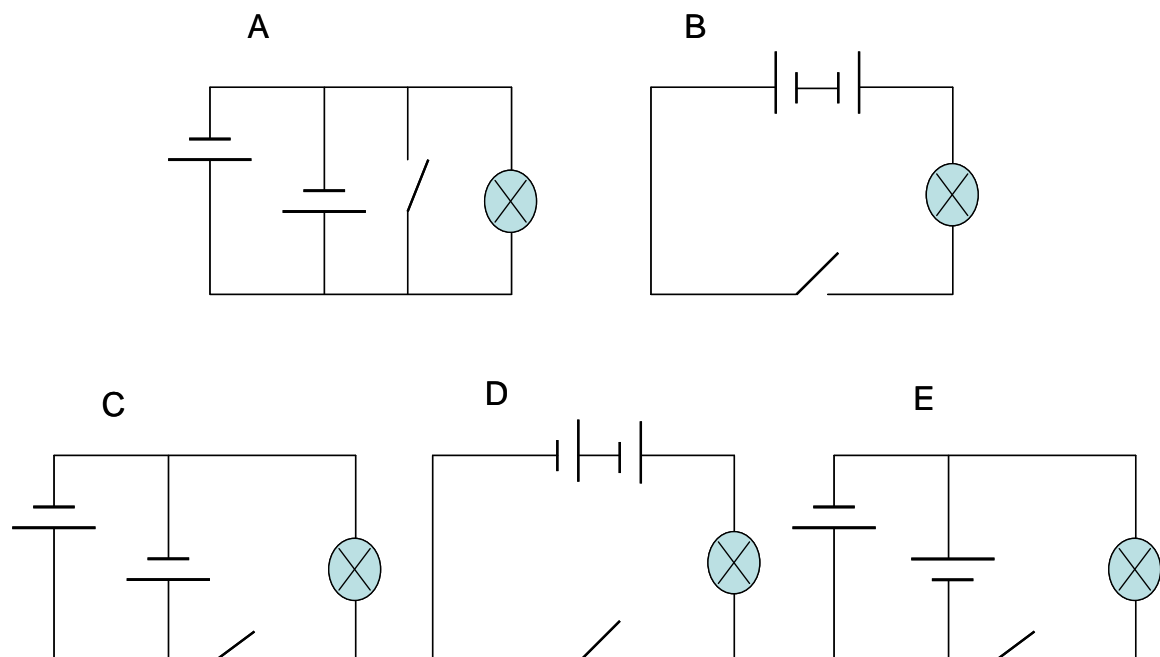
Answer: .....

**No 13. Multiple choice (score: 1.5)**

The diagram shows a torch containing two 1.5 V cells, a switch and a lamp.



What is the circuit diagram for the torch?



Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 14. Multiple choice and explanation (score: 2)**

Desert is an area characterized by low rainfall, high evaporation and low humidity. In such a condition, desert plants survive by adapting themselves structurally and physiologically. Which of the following is the least possible adaptation of desert plants?

- A. shallow and spreading roots
- B. fleshy leaves
- C. thin & wide leaves
- D. green stems
- E. thick-cuticle leaf

Explain your answer.

Answer: .....  
 .....

**No 15. Short answer (score: 2)**

Two identical plants are grown in two different places, dark (plant A) and light (plant B). After some weeks, what is the appearance of both plants?

\*Circle the correct answers

|      | Plant A (dark)             | Plant B (light)            |
|------|----------------------------|----------------------------|
| Leaf | * Light green / Dark green | * Light green / Dark green |
| Stem | * Thick / Thin             | * Thick / Thin             |

**No 16. Multiple choice (score: 1)**

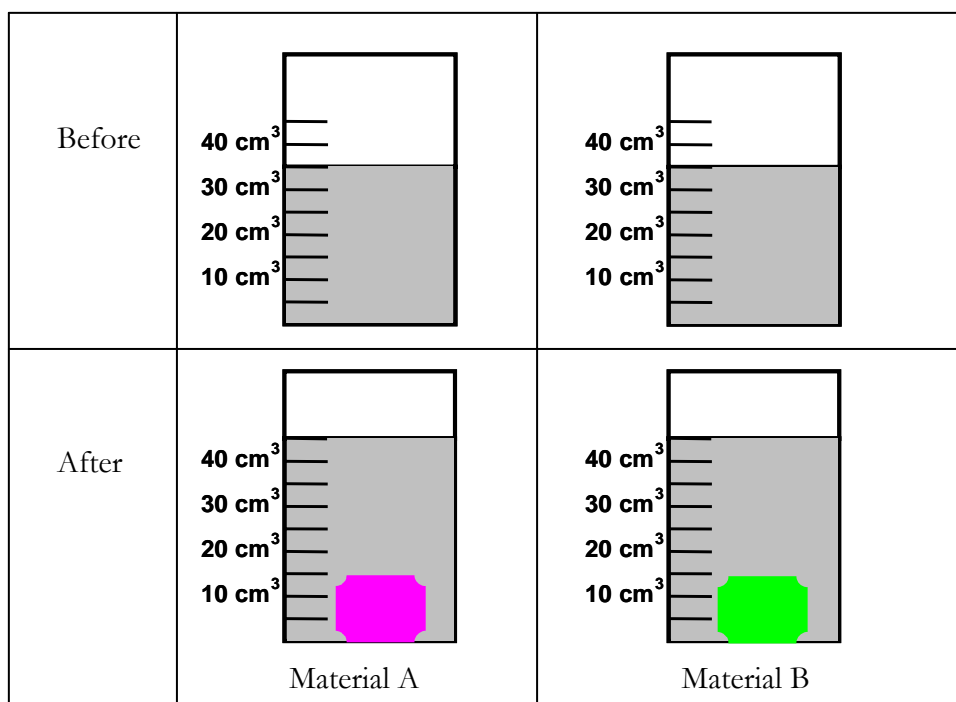
Tofu (soybean curd) contains high amount of protein from soybean. Choose other examples of food which contains high protein:

- A. Cheese
- B. Bread
- C. Potato chips
- D. Chicken curry
- E. Jelly

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 17. Multiple choice (score: 3)**

The following figure shows water levels in a measuring glass before and after two unknown materials are put into the water.



If the density of material A is greater than material B, which of these statements is true?

- A. Density of both materials are less than the density of water
- B. Material A is heavier than material B
- C. Volume of material A is greater than that of material B
- D. Mass of material A is same as material B
- E. Mass of material A is less than material B

Explain your answer : .....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 18. Explanation (score: 2)**

The following picture is example of bridge surface. You will see that the interconnection of steel must leave small spaces.



What is the function of the space between the interconnection of steel?

**Answer:** .....

**No 19. Short answers (score: 1.5)**

All the matter in the Universe is made up of very small particles which called **atom**. The centre of atom is....., which is made up of..... and .....

**No 20. Explanation (score: 2)**

Steve put some ice cubes into a glass. After a while he saw some water droplets on the outer surface of the glass. If the air humidity is lowered, what will you observe? Explain your answer.

**Answer:** .....

**No 21. Multiple choice (the answer is more than one, score: 1)**

Which of the following are **not** alloy?

- a. bronze
- b. iron
- c. brass
- d. steel
- e. aluminum

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 22. Multiple choice (score: 1.5)**

The lowest transpiration occurred when the air is ...

- A. hot, damp, not windy
- B. cold, damp, not windy
- C. hot, dry, windy
- D. cold, dry, windy
- E. hot, dry, not windy

**No 23. Multiple choice (score: 1)**

Which of the following food preservation method that does not require heating? (the answer is more than one)

- A. pasteurization
- B. canning
- C. salting
- D. smoking
- E. acidified (pickling)

**No 24. Multiple choice (the answer is more than one, score: 1)**

Choose the right statements concerning the production of energy using ethanol.

- A. The ethanol can be used for car fuel
- B. The ethanol is one of renewable energy
- C. The ethanol is one of nonrenewable energy
- D. The ethanol is classified as biofuel
- E. The ethanol is classified as fossil fuel

**No 25. Multiple choice (score: 1.5)**

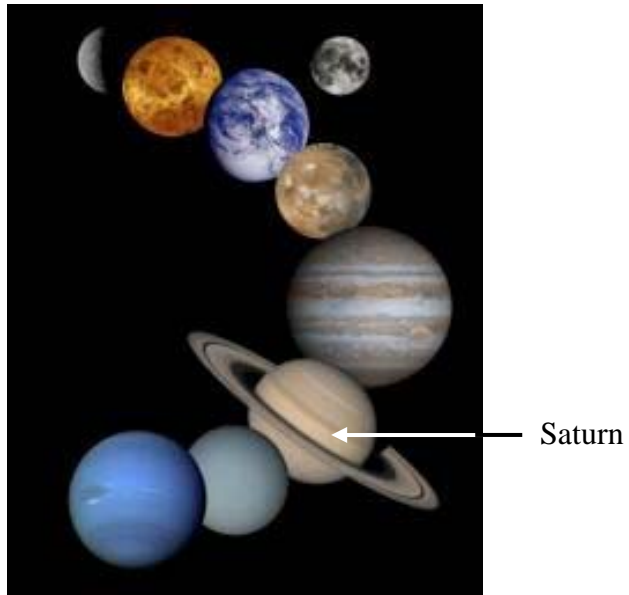
Red face after exercise is caused by ...

- A. The blood vessels in the skin stretched, so that less blood comes under skin surface in order to release heat.
- B. The blood vessels in the skin increase in the diameter, so that less blood comes under skin surface in order to take oxygen.
- C. The blood vessels in the skin increase in the diameter, so that more blood comes under skin surface in order to release heat.
- D. The blood temperature decrease, so that more blood comes under skin surface to warm the blood.
- E. The blood temperature increases, so that more blood pigment is produced.

*Name:* \_\_\_\_\_; *Country:* \_\_\_\_\_

**No 26. Short answers (score: 1.5)**

The following picture shows part of our solar system.



Draw arrows to indicate the Earth, Jupiter and Neptune.

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 27. Explanation (score: 2)**

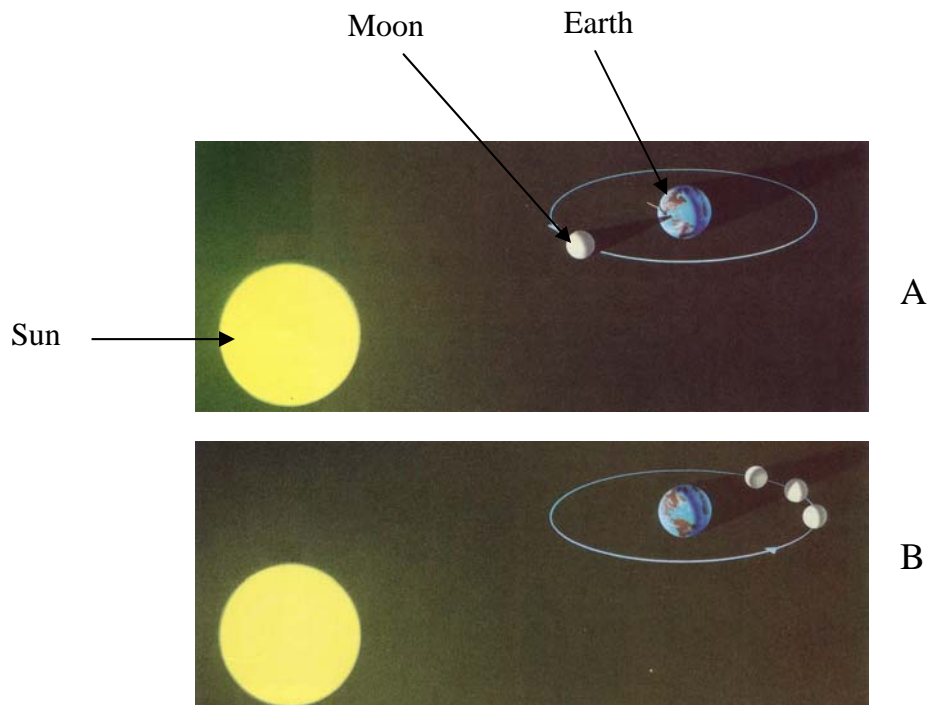
From the following pictures,

- a) which one (A or B) represents the lunar eclipse?

.....

- b) why is the duration of solar eclipse shorter than the lunar eclipse?

.....



**No 28. Explanation (score: 2)**

Global warming which raises the earth temperature is caused by accumulation of pollutants in atmosphere. The pollutants are produced by factories, vehicles, forest fire etc. Explain briefly why the pollutant accumulation in the atmosphere raises the earth temperature.

Answer:

.....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 29. Multiple choice (score: 2)**

A scientist, Ingenhousz, sets up an apparatus for his investigation. A large glass container filled with water and a water plant (*Hydrilla* sp.). The investigation is shown in Figure 1.

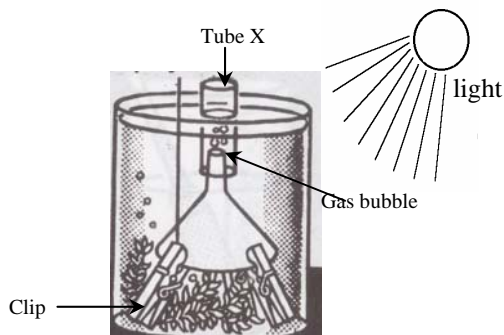


Figure 1

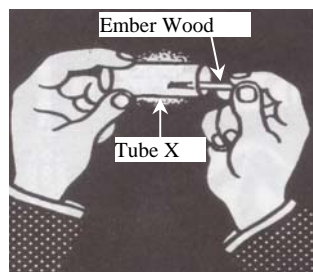


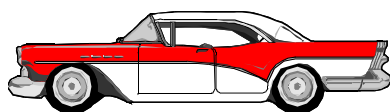
Figure 2

He observed that the plants produced gas bubble which was collected in the tube X. What will happen if he inserts the ember wood into the tube X such as shown in figure 2?

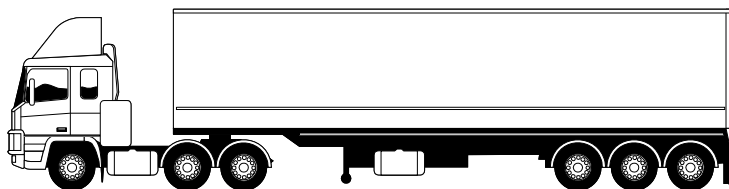
- A. The fire of ember wood will out.
- B. The fire of ember wood will flare up.
- C. Nothing will happen.
- D. The tube X will be filled smoke
- E. The tube X will be filled drops of water.

**No 30. Explanation (score: 1)**

Look at vehicles passing a road. You will note that large vehicles usually have much tires compared to small vehicles. Vehicles carrying container box, fox example, may have as much as twelve tires, while the small ones have only four tires. Explain briefly why such constructions are used.



Small vehicle



Large vehicle

Answer: .....